

DETAILED ACTION

Claim Objections

1. Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 6 recites that there are at least two integrating stages, where claim 5 recites a plurality of integrating stages. The meaning of the phrase 'at least two' is synonymous with the term 'plurality'.
2. Claims 12-18 are objected to because of the following informalities: the preamble should read "*An* apparatus ..." for claim 12, and "The apparatus" for claims 13-18. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 14 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 incorporates all the limitations of claim 13, but then goes on to describe the configuration of the tubes as "adjacent", whereas claim 13 describes this relationship as "concentric". It is not clear which configuration Applicant intends to claim.

Claim 17 inadequately describes from which entrances the cross-sectional area decreases in relation to, or how many entrances are made reference to.

For the remainder of the office action, rejections are based on the claims as best understood by Examiner.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Clark (4,062,373).

Clark discloses a device that, during its normal and usual operation, will perform the method of providing variable concentration fluid mixtures, including the steps of

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providing equal flows of at least first and second fluid components (see column 5 lines 30-33: "equal pressure of the gases being mixed" – because of this, the flow rates will be equal), selectively switching the flows to a mixing stage for durations related to the intended concentration (column 5 lines 23-30), wherein said selective switching provides an outputted fluid mixture at a substantially constant outward flow (inherent to this device because "the gases to be mixed are sequentially supplied to the mixing chamber", see column 5 lines 19-20, and because the fluid flows are equal).

With regard to claim 7, Clark discloses the following: the restrictors (in line from the reservoirs) flow only 60-80 mL per minute (column 5 lines 51-53), and the reservoirs having a capacity of 500 mL (column 5 lines 54-56). It can be inferred from these facts that the restrictors are meant to handle the flow of fluid for several minutes. Moreover, because Clark discloses the valves being cycled over a period of 2 to 4 milliseconds (column 5 lines 56-59), and that in many situations the desired end concentration is set (column 3 lines 49-43), it can be inferred that the step of selectively switching the flows provides switching at a substantially constant frequency.

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Dec. 13, 1977

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4,062,373

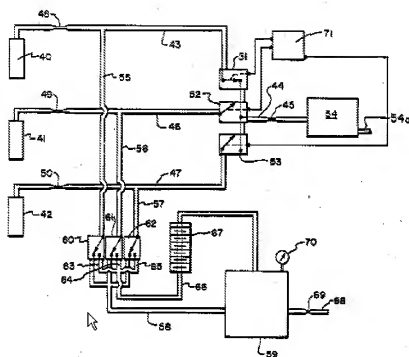


FIG. 3

Claim Rejections - 35 USC § 103

1. Claims 2, 3, 4, 8, 9, 12, 13, 16, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark as applied to claim 1 above, and further in view of Hoppe (US Patent 4,859,067).

Clark discloses all the limitations of claim 1, and also a mixing chamber 54, but not the frequency-multiplying mixer of claim 2. However, Hoppe teaches a frequency-multiplying mixer. One having ordinary skill in the art at the time of invention would have supplemented Clarks mixing apparatus with Hoppe's frequency-multiplying mixer to predictably obtain a device which, during its normal and usual operation, would sequentially mix fluids into a more homogenous solution, while maintaining a constant output flow rate.

With regard to claim 3, Hoppe's device will also, during its normal and usual operation, feed the fluid mixture into an inlet 6 of a frequency multiplier, passing the fluid mixture from the inlet through a plurality of spaced conduits 3.sub.1, 3.sub.i, & 3.sub.n to an outlet 13 of the frequency multiplier, the mixture passing through the plurality of conduits at different flow times (inherent because, as the volume of fluid mixture in the mixer increases it will spill over through the lower conduits first), thereby providing frequency multiplication of concentration ripple (inherent from the spacing of the conduits).

With regard to claim 4, Hoppe's device will also, during its normal and usual operation, also divide the amplitude of the concentration ripple due to the mixing effect it has on the fluid.

With regard to claim 8, Clark's mixing apparatus as modified by Hoppe in the analysis of claim 2 above will necessarily, during its normal and usual operation, modify the ripple in a fluid mixture produced by mixing a plurality of fluid components together (see Clark's mixing chamber 54), and feed the fluid mixture through a frequency multiplier (via use of Hoppe's frequency multiplier with Clark's mixing apparatus, as set forth in the analysis of claim 2) which operates to multiply the frequency of the concentration ripple and to divide its amplitude (see analyses of claims 3 and 4 above).

With regard to claim 9, Clark and Hoppe disclose all the limitations of claim 8, but not the additional limitation of claim 9. However, the characteristic of providing at least two times frequency multiplication amounts only to a design choice expedient, directed to a quantitative measurement of functional performance. One of ordinary skill in the art at the time of invention would have modified Hoppe's frequency multiplier with more conduits to produce a final mixture, the homogeneity thereof being characterized by at least two times the input frequency, where such homogeneity is required for reasons related to the mixture's intended use.

With regard to claim 12, the device set forth in the analysis of claim 2 discloses an apparatus capable of modifying concentration ripple by mixing a plurality of fluid components together, including a mixture inlet (space defined by interior of outer tube and exterior of inner tube, adjacent the conduits), a mixture outlet (space defined by interior of inner tube, adjacent the conduits) and a plurality of conduits (3.sub.1, 3.sub.i, and 3.sub.n) between the inlet and the outlet operable to allow passage of mixture from the inlet to the outlet at different flow times (see analysis of claim 3), thereby providing frequency multiplication of concentration ripple (see analysis of claim 3).

With regard to claim 13, Hoppe also teaches the inlet 6 and outlet 13 being provided by first and second substantially concentric tubes (see FIG 3 – inner tube extends to exit , and outer tube extends to inlet attachment) closed at one end thereof (see top of FIG 3) and the conduits being provided as apertures 3 in the innermost tube between inlet and outlet provided by the tubes.

With regard to claim 16, Hoppe also teaches the spacing between adjacent conduits to decrease from an entrance to each of the inlet and the outlet (see spaces between conduits 3.sub.1 compared to spaces between conduits 3.sub.i).

With regard to claim 17, Hoppe also teaches the cross-sectional areas of each of the inlet and the outlet decreasing from an entrance thereof (according to the meaning of

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the terms inlet and outlet as set forth in the analysis of claim 12, both the inlet and outlet cross-sections decrease towards the bottom of FIG 3).

With regard to claim 20, see analysis of claim 1, supra. (Broadest reasonable interpretation of the term 'switch' reads on the controller of claim 1 – it has at least two states, and the ability to change between the states.)

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Aug. 22, 1989

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4,859,067

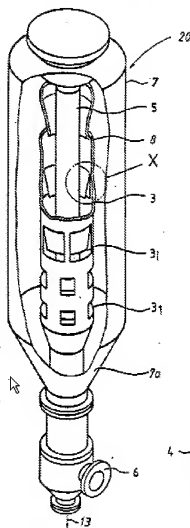


Fig. 3



Fig. 3a

2. Claims 5; and 10,11,19, & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over: Clark as applied to claim 1 above; and Clark & Hoppe as applied to claim 8 above, respectively; and further in view of Goudy (US Patent 4,259,021).

Clark discloses all the limitations of claims 1 and 8, but not the additional limitation of claims 5 and 10. However, Goudy teaches a device for mixing fluids, which includes the step of passing the fluid mixture through a plurality of integrating stages 38. One having ordinary skill in the art at the time of invention would have supplemented Clarks mixing apparatus with Goudy's integrating to predictably obtain a device which, during its normal and usual operation, would sequentially mix fluids into a more homogenous solution, while maintaining a constant output flow rate.

With regard to claim 11, the structure outlined in preceding paragraph with regard to claim 10, would, during its normal and usual operation, modify the ripple in a fluid mixture (see analysis of claims 3 and 4 above), where said mixture is produced by mixing a plurality of fluid components together (see 54 of Clark), including the step of feeding the fluid mixture through a plurality of integrating chambers (38 of Goudy).

With regard to claim 19, the structure set forth in the analysis of claims 5 & 10 teaches a fluid mixture integrating assembly which includes a plurality of integrating chambers (38 of Goudy).

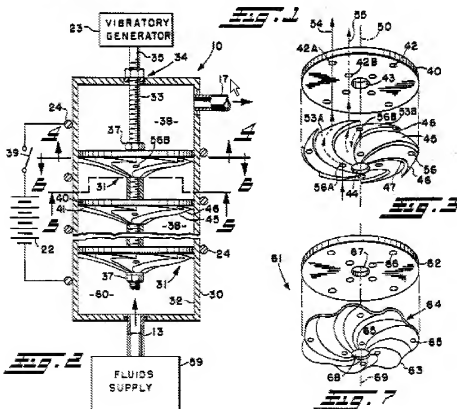
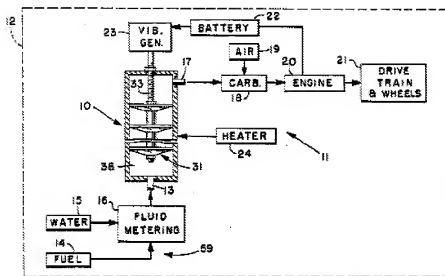
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With regard to claim 21, see analysis of claim 1, supra. (Broadest reasonable interpretation of the term 'switch' reads on the controller of claim 1 – it has at least two states, and the ability to change between the states.)

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3. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark and Hoppe as applied to claim 13 above, and further in view of Willmann (US Patent 4,085,717).

Clark and Hoppe disclose every limitation of claim 13, and the use of an inlet tube which is adjacent the outlet tube (under the doctrine of broadest reasonable interpretation, the term 'adjacent' is a superset of the term 'concentric'), but not the additional limitation of using capillaries, as found in claim 14. However, Willmann teaches the use of capillary tubes 85 & 86 for fluid communication between inner and outer tubes 77 & 75. One having ordinary skill in the art would have modified the Clark and Hoppe mixing apparatus with a large number of Willmann's capillary tubes to predictably obtain a mixing apparatus capable of greatly reducing concentration ripple in the resultant mixture.

With regard to claim 15, the structure set forth in the preceding paragraph has the adjacent tubes located in a common housing (the inlet tube of Clark's FIG 3) and the capillaries are located in a wall (the outlet tube of Clark's FIG 3) separating the inlet and the outlet in the housing.

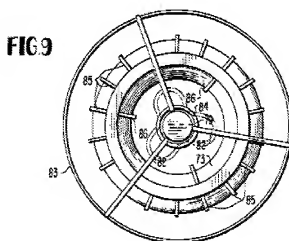
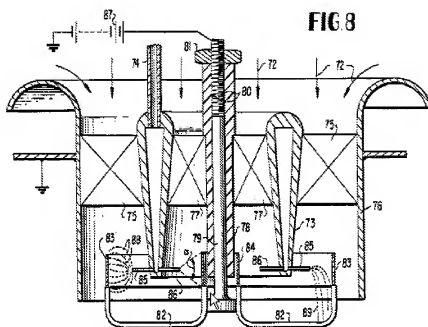
4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clark and Hoppe as applied to claim 12 above, and further in view of Reinemuth (US Patent 6,200,016).

Clark and Hoppe disclose all the limitations of claim 12, but not the further limitation of claim 18. However, Reinemuth teaches the use of a glass coating on components of a mixing assembly. One having ordinary skill in the art at the time of invention would have modified Clark and Hoppe's mixing apparatus with according the Reinemuth's teaching to predictably obtain a mixing apparatus capable of handling corrosive fluids.

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4,085,717



Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. McCalister whose telephone number is (571) 270-1869. The examiner can normally be reached on M-F, alt. Fridays off, hours 9-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Isabella can be reached on (571) 272-4749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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11/28/07

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